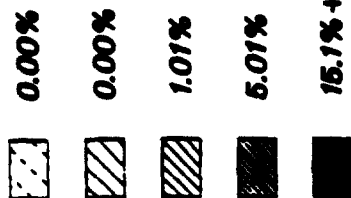


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**VOICE MESSAGE
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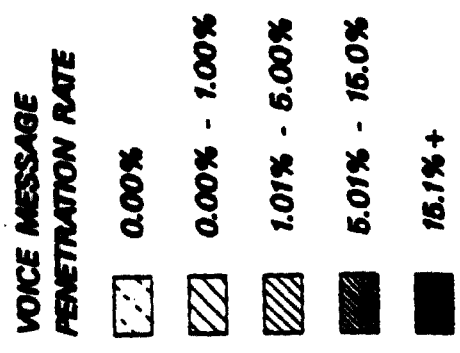
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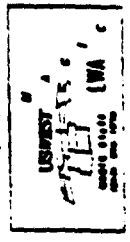
VOICE MESSAGE PENETRATION RATE BY WIRE CENTER



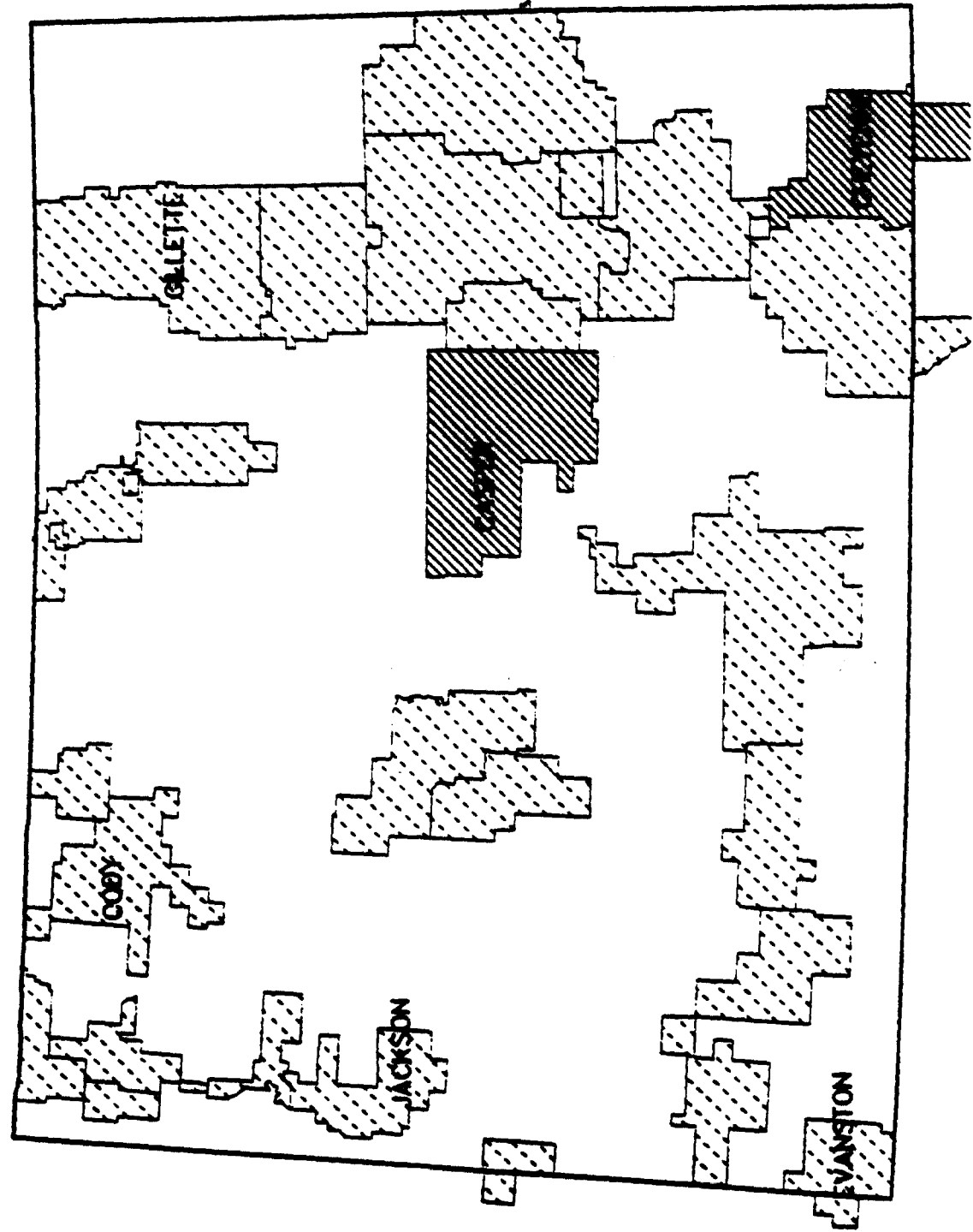
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D



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AFFIDAVIT OF MARK D. SCHMIDT

I, Mark D. Schmidt, being duly sworn, depose and say as follows:

1. I am employed by U S WEST Communications, Inc. ("U S WEST"), as a Technical Director in the Network Planning organization and am a Network subject matter expert on network interconnection issues. In this capacity, I am familiar with technical issues that arise from U S WEST's obligations under the Telecommunications Act of 1996 to provide interconnection service, unbundled elements, and local telephone resale service.

2. I have also reviewed sections 159 through 162, "Loop Spectrum Management," of the Federal Communication Commission's ("FCC's") Notice of Proposed Rulemaking ("NPRM") FCC 98-188.

3. The NPRM specifically "seeks comment on whether two different service providers should be allowed to offer services over the same loop, with each provider utilizing different frequencies to transport voice or data over that loop." The NPRM seeks comments on the issue that I refer to as "frequency unbundling."

4. U S WEST currently offers several services that deliver simultaneous voice and data to a customer over the same copper loop. Integrated Services Digital Network ("ISDN") service is a switch based service. The voice and data signals for ISDN are combined at the switch. Consequently, loops that carry ISDN service cannot be separated into distinct, separable voice and data transmission paths and therefore cannot be frequency unbundled. Another type of a service in which separate voice and data signals

are transmitted over the same loop is U S WEST's MegaBit® Service. The MegaBit® Service utilizes Rate Adaptive Digital Subscriber Line ("RADSL") technology to deliver data service. The RADSL equipment is located in the U S WEST central office where a splitter joins the voice and data service onto the individual copper facility.

5. It is presumed that the FCC is seeking comments on the technical feasibility of using an unbundled loop facility to provide simultaneous voice and Digital Subscriber Line ("DSL")-delivered data services to customers. Although U S WEST is able to offer simultaneous voice and data service as I have described, it is not technically feasible to provide the same, or similar, service when the voice and data channels are provided by two separate service providers. Unresolved spectrum management and spectrum compatibility of competing technologies will jeopardize the reliability of the U S WEST network, and consequently, the reliability of services delivered to customers.

6. DSL equipment is manufactured in many varieties, by many manufacturers, to provide data in several DSL formats. These formats include ISDN, HDSL, IDSL, ADSL, SDSL, RADSL and UADSL. The national T1E1 standards body has not completed work to establish standards for spectrum and power compatibility for several of these technologies. As a result, several of these technologies have developed absent national standards and equipment manufacturers have developed *de facto* standards for their respective equipment. Consequently, the spectral allocations and transmission power levels for this equipment varies by manufacturer.

7. The lack of spectrum and transmission power standards for these technologies is the basis for my determination of technical infeasibility when they are used in combination with the voice frequency on a copper loop (frequency unbundling). For example, IDSL and SDSL technologies operate in a frequency range that overlaps the frequency range used for voice services. My analysis is that when these DSL

technologies are combined on a copper loop with a voice service, leakage will occur between the voice and data signals resulting in very poor (noisy) voice service.

8. A national requirement for U S WEST to offer frequency unbundling of its loops will create voice and data service degradation problems for customers regardless if the services(s) are provided by U S WEST or a CLEC. The incompatibility of these competing technologies could severely degrade the service quality for one service or the other. The introduction of different technologies into a single loop could thus cause harm to an existing service to a customer that has enjoyed years of reliable service. In fact, service degradation problems are likely to be intermittent and extremely difficult to isolate. This very real, intermittent problem will be difficult, if not impossible, for U S WEST to isolate.

9. The above example is further compounded by U S WEST's inability to determine the specific spectrum frequency and transmission power levels that CLECs will transmit across unbundled loops, even when U S WEST knows the technology used (i.e., ADSL, HDSL, RADSL, etc.). The FCC and state commissions have been silent about U S WEST's ability to create and implement a "firewall" to limit the spectrum that can be accessed by a CLEC on an unbundled loop. I do not know of a "firewall" or filter that is available that can limit the power level that can be transmitted on a loop by a CLEC without impacting the performance of existing services.

10. My discussion so far has addressed technical feasibility issues related to the provision of central office based voice and DSL-delivered data services involving U S WEST and CLECs. Another important component of network reliability is the use of high speed DSL-based modems by customers. The network reliability issues that will be created by frequency unbundling at the central office are compounded with the availability of consumer-purchased modems that will be available at computer stores and

merchandise outlets. Absent strictly enforced standards for the manufacture of this equipment, the same service degradation and network reliability problems will be introduced from the customer end of the network.

11. U S WEST is able to successfully provision its DSL-based services because it is provided in a single service provider environment where the network reliability issues I have described are avoided. U S WEST not only administers the deployment of its service, but ensures that its selected equipment manufacturers -- at both the central office and the customer's premises -- adhere to strict Power Spectral Density ("PSD") mask requirements that it has developed. These PSD masks ensure that DSL systems are spectrally compatible and able to tolerate each other's crosstalk without undue performance degradation. They are designed to accommodate most existing DSL technologies, including ISDN, HDSL, ADSL and RADSL. U S WEST is uncertain of its ability to impose these same PSD mask requirements on CLECs or their customers since there are no national standards to support these requirements. Absent the agreement of CLECs and their customers to use these requirements, U S WEST does not have the ability to ensure network reliability as I have described.

12. U S WEST is able to provision and manage its DSL-delivered services because they are provided as a single service, identified as a single circuit ID and tracked in a single suite of mechanized inventory and management systems. U S WEST cannot provide a "portion" of a loop to a Competitive Local Exchange Carrier ("CLEC") because its assignment, maintenance, billing, and repair systems are not designed to manage frequency unbundling. Systems modifications required to manage frequency unbundling are yet undefined and the cost of such modifications is unknown.

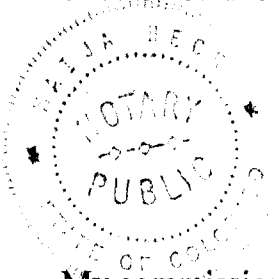
13. In summary, the implementation of frequency unbundling in the U S WEST network is not technically feasible for the spectrum compatibility and network reliability reasons I have outlined. For these reasons, the FCC should not impose national rules requiring frequency unbundling of copper loops.

Mark D. Schmidt

Mark D. Schmidt

State of Colorado)
) ss.
County of Denver)

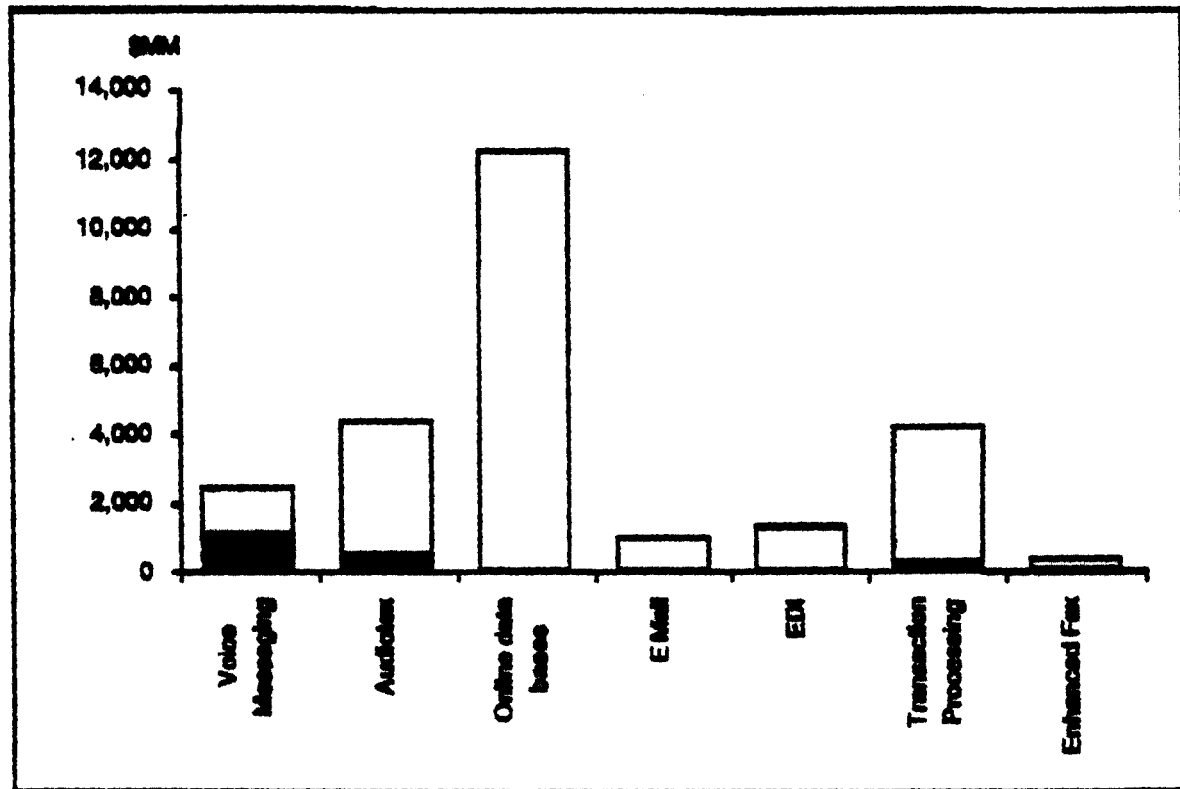
Subscribed and sworn to before me this 24th day of September, 1998.



Maïja Beck
Notary Public

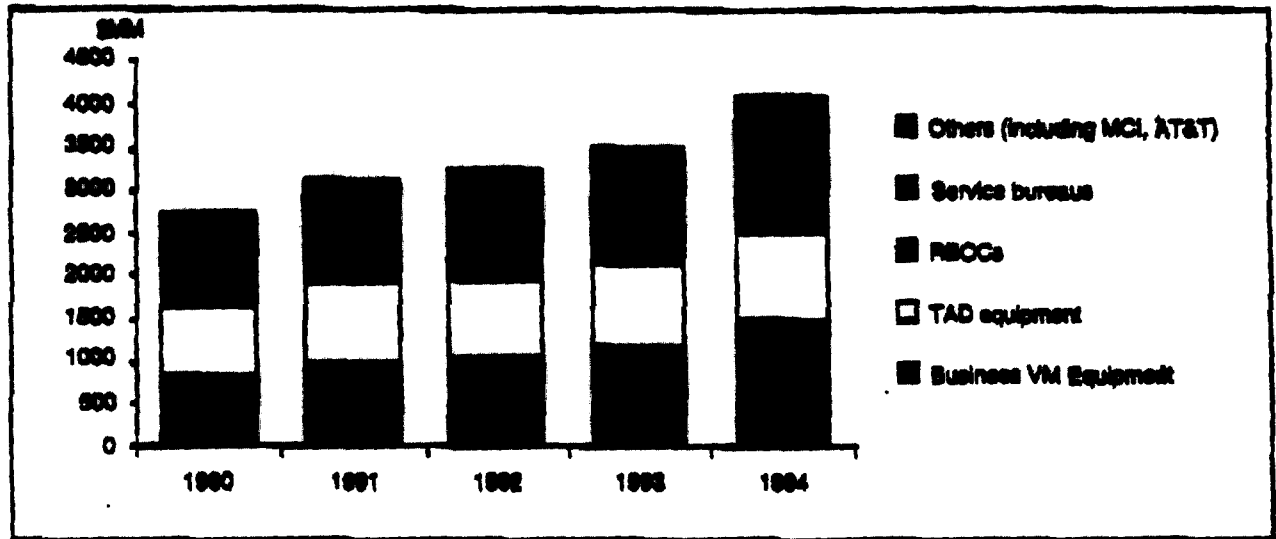
My commission expires: May 8, 2002.

Exhibit C.1: RBOC SHARE OF ENHANCED SERVICE MARKETS



Source: Insight Research, Frost and Sullivan, Marketfinders

**Exhibit C.2: VOICE MESSAGING MARKET BY VENDOR TYPE
(EQUIPMENT AND SERVICES)**



Source: Frost and Sullivan, NATA, Yankee Group, BAH Analysis

**BENEFITS AND COSTS OF VERTICAL INTEGRATION OF BASIC
AND ENHANCED TELECOMMUNICATIONS SERVICES**

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April 6, 1995

BENEFITS AND COSTS OF VERTICAL INTEGRATION OF BASIC AND ENHANCED TELECOMMUNICATIONS SERVICES

I. Introduction

The FCC is in the process of reviewing its policies to determine the form in which the Bell Operating Companies (BOCs) may participate in the enhanced services market.¹ FCC regulation of enhanced services has previously addressed two potential problems, cross subsidization and access discrimination. The FCC has established two regulatory measures that significantly reduce the risk of cross subsidization. Price cap regulation, which breaks the link between direct costs and rate changes, does not allow the BOCs to raise prices above the rate caps approved by the FCC. The BOCs, therefore, do not have the incentive to set lower rates for regulated services used in the provision of enhanced services in the hope that they can increase prices for other regulated services. In addition, the FCC has implemented cost accounting rules, including detailed joint cost rules, cost allocation manuals, reporting requirements and accounting audits, that increase the ability to identify cross subsidization.

Access discrimination can arise when preferential network access is given to an BOC's affiliated enhanced services provider over a non-affiliated enhanced service provider. The FCC decided that network unbundling, in the form of discrete cost-based services and features, for services required to provide enhanced services would insure that BOCs could not discriminate against their competitors. The FCC's Open Network Architecture (ONA) framework and its unbundling policy were designed to accomplish network unbundling for features used by non-affiliated enhanced services providers to compete with the BOCs. In its recent remand decision, the Ninth Circuit required the FCC to explain and justify its decision to allow BOCs to offer all enhanced services on an integrated basis, given the current state of unbundling.² The FCC's investigation is, however, broader in scope than the minimum requirements set out by the Ninth

¹Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services, CC Docket No. 95-20, Notice of Proposed Rulemaking (released February 21, 1995).

²California v. FCC, 39 F.3d 919 (9th Cir. 1994) ("California III")

Circuit. An important factor in the FCC's reconsideration will be determining whether the economic benefits to be gained by permitting vertical integration of BOC basic and enhanced services exceed the possible costs imposed on consumers of not requiring structural separation.

This paper identifies and quantifies the potential benefits and costs of vertical integration of basic and enhanced telecommunications services. In particular, we find that joint production facilitates the offering of new products and services, which provide large benefits to consumers. Focusing on voice messaging -- to date the most prominent Regional Bell Operating Company enhanced service -- we calculate that the delay in making this service available has cost consumers well over \$1 billion annually. The cost to consumers of delay has exceed well over \$10 billion since 1981. In addition, the extra production costs that would be incurred by foregoing the economies of scope from joint production would amount to over \$100 million annually. In contrast, (1) the enhanced service markets in which the BOCs operate are robustly competitive, (2) the existing Open Network Architecture rules followed by the BOCs are designed to offer nondiscriminatory access at prices that avoid cross-subsidies, and (3) all available evidence shows that these rules are working as intended and that the enhanced service market is thriving. It is clear that any benefits to competition that may arise from structural separation are far outweighed by the loss of benefits and extra costs we have identified which arise from structural separation.

The remainder of this paper has five sections. We first describe the economic principles that should guide telecommunications competition. In Section III, we examine the state of competition in information and enhanced services markets. Next, in Section IV, we measure the benefits from offering new telecommunications services. Section V quantifies the costs of structural separation. The final section summarizes our findings.

II. Economic Principles for Economically Efficient Competition

Telecommunications markets are generally very dynamic, compared to most other markets. Products are proliferating, new firms are joining the fray, and existing firms are adjusting through alliances, mergers, and the like. The market for enhanced telecommunications services is no exception. For voice messaging, which accounts for the bulk of the BOCs' enhanced service revenues, Frost & Sullivan estimated that 1993 revenues from voice messaging services were \$1.4

billion and that the market is expected to grow at a rate of 12.7 percent annually through the year 2000.³ In addition, revenues from competing voice messaging CPE are an equivalent amount and are growing at double digit rates.⁴ In total, voice messaging revenues are approaching \$3 billion annually. Further, there are literally thousands of firms providing voice messaging services, and the BOCs are far from enjoying a dominant position. For dynamic markets like these, it is especially important that firms be able to compete on their own merits, absent regulatory rules that help or hinder particular firms. In this section, we discuss the economic principles for efficient competition in dynamic markets.

A. Telecommunications competition (including enhanced services markets) is characterized by firms competing on the basis of unique scope economies

Telecommunications has always been characterized by economies of joint production, or scope economies. With the convergence of industries -- telephony, information, etc. -- the importance of scope economies is even greater. For example, AT&T has recently acquired McCaw, which provides cellular services, including voice messaging; Sprint has formed a venture with major cable television firms, and was the high bidder at the recently concluded broadband PCS spectrum auction. Clearly, although the BOCs have long possessed economies of scope, other competing firms have their own unique economies. To provide the greatest benefits to consumers, it is essential that all firms be able to employ these economies. The results of this type of competition are lower prices for consumers and greater availability of new services in a timely fashion. Measures that unduly restrict the employment of scope economies, such as onerous structural separation requirements, will reduce the benefits from competition and harm consumers.

Economists are close to unanimous in believing that, whenever feasible, effective competition produces results superior to those of comprehensive economic regulation. The potential benefits of introducing competition into regulated markets generally are of two major

³Frost & Sullivan, U.S. Voice Messaging Service Markets, Report 5172-63 (Dec. 1994).

⁴NATA, 1993-94 Telecommunications Market Review and Forecast 171 (1994).

kinds: moving prices into closer correspondence with economic costs, and dynamic improvements in productive efficiency and in product or service offerings. Competition will concentrate on the services whose prices are held above marginal or incremental costs and tend to drive those prices down to the economically proper and efficient levels. Competition also tends -- unless it is distorted by regulation -- to improve the efficiency with which services are provided, by weeding high-cost firms out of the market and by exerting pressure on the survivors to improve the quality of their offerings and to be innovative in developing and offering new services and service combinations. Thus, telecommunications regulation should allow firms to employ their economies of scope so that services can be produced at minimum cost, and should allow these firms to be free to introduce innovative services which creates large gains in consumer welfare.

III. BOC Participation in the Enhanced Services Market Has Led to Lower Prices and Greater Output

BOC participation in the enhanced services market has been good for consumers. Consumer welfare increases when prices decrease. In the voice messaging services segment, which is the primary segment of current BOC participation, prices have decreased significantly since BOC entry. The range of the price decrease has been from about \$30 per month in 1990 to \$5-15 per month currently. An additional increase in consumer welfare arises when a new product is offered to a segment of consumers for the first time. BOC success in offering voice messaging to the "mass market" of residential and small business customers has been phenomenal. Over the past 5 years BOC subscriptions have increased from essentially zero to over 6 million subscriptions.³ Growth for the rest of the decade is forecast at around 12 percent per year. No anticompetitive effect has occurred in voice messaging or other segments of the enhanced services market. Thus, BOC participation has been pro-competitive and has increased consumer welfare.⁴

³"Voice Messaging," Telephony, Feb. 20, 1995, at 23.

⁴For BOC entry to have an anticompetitive effect, output would need to be lower than it would have been if the BOCs had been prohibited from participation. No party can seriously claim that output would have been higher without BOC participation. Effects on individual

The regulatory road for the BOCs to provide enhanced services has been long and tortuous. In 1981 AT&T applied to the FCC for permission to provide "Custom Calling II" services, which included voice messaging services, on an unseparated basis.⁷ However, the FCC rejected AT&T's request. Subsequent to the FCC's negative decision, the Modification of Final Judgment (MFJ) went into effect. The BOCs were prohibited from providing "information services" (which had a very similar definition to the FCC "enhanced service" definition) under Section II.D.1 of the MFJ. The combined effect of the FCC decision and the MFJ caused voice messaging not to be offered to residential and small business customers by the BOCs.

The following events then transpired which permitted the BOCs to offer enhanced (information) services:

1985: The FCC begins Computer III proceedings with an emphasis on allowing BOCs to provide enhanced services subject to non-structural safeguards.

1988: (i) Judge Greene authorizes BOCs to provide "gateway" information services (which includes voice messaging under the MFJ).

(ii) BOCs file ONA plans designed to ensure competitors have Comparably Efficient Interconnection (CEI).

(iii) FCC begins approving CEI plans to allow BOCs to provide individual enhanced services on a structurally integrated basis.

1990: (i) Ninth Circuit remands Computer III to FCC.

(ii) FCC authorizes BOCs to continue to provide enhanced services on an interim basis according to CEI plans.

competitors are subsumed into the overall measure of output when a consumer welfare calculation is done.

⁷AT&T had already designed and begun to install the services on an unseparated basis prior to the FCC's Computer II decision, which required structural separation.

1991: (i) Judge Greene removes information services restriction totally.
(ii) FCC issues remand order to allow structural integration of BOC enhanced services and approves final BOC ONA plans.

1992: BOCs begin offering integrated enhanced services under ONA plans.

1994: Ninth Circuit again remands Computer III to FCC.

1995: FCC authorizes BOCs to continue to provide enhanced services under the CEI plan regime.

From an economist's viewpoint, this regulatory imbroglio has created significant social costs. As we will discuss in the next section, consumer welfare would have been significantly higher if BOC voice messaging services had been offered sooner. Furthermore, government, management, and lawyers' time has been spent debating the issue of structural separation for nearly 20 years. A rational cost-benefit analysis demonstrates that the benefit to consumers of having BOC enhanced services available far exceeds any possible cost that hypothetically might arise. Indeed, we quantify these potential benefits and costs in the next sections of this paper.

As the above regulatory history demonstrates, the key dates were 1988 and 1991, when the MFJ restrictions were removed and the FCC decided to allow BOCs to offer enhanced services on a structurally integrated basis. Beginning in 1988, pending approval of final ONA plans, BOCs were permitted to offer specific enhanced services on a structurally integrated basis, subject to FCC approval of CEI plans for those services. The FCC ultimately approved blanket authorization for BOCs to offer enhanced services without a structural separation requirement in 1991. Thus, we consider data from 1988, 1991, and the most current data available to analyze the evolution of the enhanced services market.

Overall, information services are a large part of the U.S. economy, with estimated revenues of \$135.9 billion. According to the Commerce Department, information services is

"among the fastest growing sectors of the economy."⁸ Some of the largest and most sophisticated companies in the U.S. participate in this sector, including GE, AT&T, MCI, IBM, Sears, Microsoft, TCI, Time Warner, and American Airlines.

The individual segments of the information service industry, all of which use telephone lines as well as other distribution media in varying ways, are also thriving. Enhanced (information) services have grown 15 percent a year since 1991 to reach an estimated \$15 billion in 1994. Some 65 percent of these services are delivered on-line, with the remainder delivered on CD-ROM or using wireless or other distribution technologies. Data processing and network services are another segment which has grown by over 14 percent a year since 1991 to over \$50 billion by 1994. This segment includes services such as credit card authorizations, data entry, payroll processing, electronic mail, and electronic data interchange. Lastly, computer professional services have grown by about 9 percent a year to reach \$65 billion in 1994. This segment includes systems integration and consulting services. Thus, no anticompetitive effect of BOC entry into information services has occurred. Overall, the market continues to be very competitive.

The market segment for enhanced (information) services is particularly relevant here since this segment includes many of the business which the BOCs have entered. This segment, including on-line databases, value added network services, voice messaging, and electronic mail, grew from \$7.5 billion in 1988 to \$10.2 billion in 1991 and to \$13.6 billion in 1993, which is the last available data.⁹ Market growth in 1993 was 16 percent, which was higher than the year before. The market is expected to maintain that rate of growth for the next few years.¹⁰

Value added network (VAN) services have grown from \$0.5 billion in 1989 to \$3.4 billion in 1993. Subscribership to all videotex gateways increased from 715,000 in 1988 to 6.3 million

⁸U.S. Dep't. of Commerce, 1994 U.S. Industrial Outlook 25-21 (1994).

⁹U.S. Industrial Outlook: 1990 at 29-2, 1992 at 26-1, 1994 at 25-2. The Commerce Department discontinued this publication in 1995.

¹⁰1994 U.S. Industrial Outlook 25-2 and 29-7.

in 1994.¹¹ Electronic mail has become widely available since 1988. E-mail subscribership has grown from 6 million in 1989 to over 13 million in 1993.¹² E-mail revenues increased from \$574 million in 1989 to \$740 million in 1991 and an estimated \$1.2 billion in 1994. BOCs have not attained anything remotely close to a dominant position in any of these enhanced market segments.

Similarly, BOC entry into the voice messaging market segment has led to lower prices and higher demand. Between 1989 and 1991, users of voice messaging CPE more than doubled, from 5.3 million to 11.6 million, and now accounts for \$1.3 billion annually.¹³ The overall voice messaging market segment grew from \$665 million in 1989 to \$1.1 billion in 1991 and \$1.54 billion 1994. Forecasts of future growth have the market doubling to over \$3 billion by 2000.¹⁴ Forecasted annual growth over this period is 12 percent. Thus, output has expanded rapidly in the voice messaging market segment which demonstrates the pro-competitive effects of changes in FCC and MFJ regulation.

Since 1991, prices have decreased by 50 percent for most voice messaging equipment. Equipment improvements such as voice messaging boards for PCs have become widely available at relatively low cost. Thus, voice messaging equipment continues to place a significant price constraint on network-based voice messaging services.

Prices for voice messaging services have decreased greatly since BOC entry into the market segment. Frost and Sullivan states that in 1990 the average monthly fee for voice messaging was just under \$30. By 1993 the average monthly fee decreased by about 50%, or a decrease in price of over 20 percent per year. Frost and Sullivan attributes this "dramatic drop" in prices to the growth of a more competitive market, driven by the lower-priced voice messaging offered by the BOCs and the independent LECs. By 2000, Frost and Sullivan predicts a further

¹¹Boston Globe, Jan. 14, 1995, at 61.

¹²1990 U.S. Industrial Outlook 31-4; 1994 U.S. Industrial Outlook 29-7.

¹³NATA, 1991 Telecommunications Market Review and Forecast 135 (1991); NATA, 1993-94 Telecommunications Market Review and Forecast 171.

¹⁴NATA, 1993-94 Telecommunications Market Review and Forecast 171; Frost & Sullivan, U.S. Voice Messaging Services Markets, Report 5172-63 (Dec. 1994).

decrease in the average fee for voice messaging by about another 50 percent (pp. 3-10 to 3-11).

Regarding current market conditions, Frost and Sullivan reports that:

"Today, there are numerous providers of voice messaging services in a highly competitive market. The entrance of the BOCs and independent LECs in the late 1980s create fierce competition for the local/regional service bureaus....The RHCs and independent LECs have developed the residential end-user market, which previously had little interest in or knowledge of voice messaging." (p. 1-4)

Lower prices, increased competition, and development of a new market segment have been the result of BOC entry into the voice messaging segment of the enhanced services market. All of these outcomes lead to increased consumer welfare. This pro-competitive outcome stands in stark contrast to FCC and MFJ regulatory policy in the early and mid-1980s which led to an absence of BOC participation in enhanced service markets. Consumer welfare was lower and the economic efficiency of the U.S. economy was lowered by these misguided regulatory policies. Thus, as we discuss below, the FCC policy of structural integration and removal of the MFJ restrictions on information services provision by BOCs has led to a significant increase in consumer welfare which easily exceeds over \$1 billion per year.

We finally observe that the voice messaging market is very unconcentrated. The BOCs and GTE combined account for about one-sixth of voice messaging revenues combined. However, individual LEC market shares are much lower. BOC market shares for voice messaging services range from around 6 percent for Bell Atlantic, BellSouth, and Pacific Telesis, to about 1 percent for NYNEX. Competition continues to be very strong for voice messaging customers, with both service prices and equipment prices decreasing at a rapid rate.

IV. Consumer Welfare from New Telecommunications Services

A. The Economic Importance of New Telecommunications Services

Regulatory restrictions which are designed to facilitate competition may often have a potentially much larger negative effect on consumer welfare which cannot be ignored: restrictions

on the introduction of new goods and services.¹⁵ Consider the introduction of a new telecommunications service which is not presently available — call it home distance learning over personal computers. The demand for such a service will exist, as will a demand curve, which is a schedule of quantities which would be bought at each monthly service price. See Figure 1. At lower prices more service is demanded, but even at quite high prices some demand remains from people who value the service quite highly. If the service were offered at price p_1 in Figure 1, all those individuals who would have paid more than p_1 receive the difference between what they would have paid and what they actually pay in increased consumer welfare. This added value is called the consumer's surplus and is the area labelled A in Figure 1. Consumer's surplus is a dollar measure of increased consumer welfare, and is almost universally accepted by economists and policy makers in valuing the effects of economic policy.

Now suppose because of regulation that home distance learning is not offered. For instance, if structural separation is required, the cost of the BOCs providing home distance learning might well be sufficiently high that, at prices which would be charged, insufficient consumer demand would exist to make the economic return on the investment high enough to justify the investment.¹⁶ The home distance learning application would then not be offered. No matter how much an individual is willing to pay, he cannot buy the home distance learning service. Indeed, the price might as well be infinity because no one can buy the service. If regulation is changed and the service is introduced, the price decreases from infinity to p_1 . To measure the gain in economic welfare, we use the change in price from the "virtual or reservation price" which causes zero demand, price p_2 in Figure 1, to the price that will be charged, which

¹⁵The welfare effect of delayed introduction of new goods or services has not been considered in most analyses of the economic effects of regulation. See, e.g., P. Joskow and N. Rose, "The Effects of Economic Regulation," in R. Schmalensee and R. Willig, Handbook of Industrial Organization, vol. II (1989) for a review of the effects of regulation.

¹⁶While the demand curve in Figure 1 demonstrates that some consumer demand would exist unless prices became quite high, at high prices caused by high costs demand may not be enough to cover the fixed costs of providing the service. Fixed costs of providing enhanced services are almost always a large component of the overall costs of providing the service.

is p_1 in Figure 1.¹⁷ The large change in price will lead to a large increase in economic welfare so long as significant demand exists for the new product or service.

The economic theory of the valuation of new goods was developed by the Nobel Prize winning British economist Sir John Hicks in 1940. In recent papers, Hausman further developed the theory and has applied it to measuring the consumer welfare cost of the delay in the introduction of cellular telephone.¹⁸ We will first apply the theory to the case of voice messaging, which had a delayed introduction of approximately 5-7 years, to demonstrate the large potential losses in consumer welfare from regulatory-caused delays or even permanent postponement in the introduction of new telecommunications services.

B. Consumer Welfare Losses from the Delay in Voice Messaging

Voice messaging using central office-based telephone technology was sufficiently developed to begin operation in the early 1980's in the U.S.¹⁹ As noted, AT&T applied for permission with the FCC in 1981 to provide "Custom Calling II" services, which included voice messaging services, on an unseparated basis. However, the FCC rejected AT&T's request, mainly because of fears of cross subsidy.²⁰ AT&T had claimed that it would need to redesign its network equipment to provide messaging on a structurally separated basis, but the FCC rejected the claim. AT&T stated that a redesigned system for structural separation would take three years to introduce, and the additional cost would be substantial. The FCC decided that, since it was "technically possible" to provide structurally separated voice messaging, AT&T would not be

¹⁷For an application of the theory of the valuation of new goods and extension of the theory in a non-regulated context, see J. Hausman, "Valuation of New Goods Under Perfect and Imperfect Competition," MIT Working Paper (June 1994a).

¹⁸The papers are J.R. Hicks, "The Valuation of the Social Income," Economic Journal (1940); Hausman, 1994a, op. cit.

¹⁹See R.F. Rey, ed., Engineering and Operations in the Bell System (1983) for an early description of the development of AT&T's custom calling services.

²⁰AT&T Petition for Waiver of Section 64.702 of the Commission's Rules and Regulations §18, 88 F.C.C. 2d 1 (1981). The FCC recognized the presence of economies of scope in voice messaging (§17) but feared a "slippery slope" that would create regulatory uncertainty.

allowed to provide it on an integrated basis (§53). Extra economic costs due to structural separation had only a minor role in the FCC decision. Subsequent to the FCC's negative decision, the Modification of Final Judgment (MFJ) went into effect. The BOCs were prohibited from providing "information services" (which had a very similar definition to the FCC "enhanced service" definition) under Section II.D.1 of the MFJ. The combined effect of the FCC decision and the MFJ caused voice messaging not to be offered to residential and small customers by the BOCs.²¹ Competing service providers did not offer voice messaging services, despite their previous claims that the equipment already existed which would permit them to offer the services, and despite the FCC's belief that competing service providers would offer the services (§85, §103). Thus, residential and small business customers did not have the opportunity to purchase voice messaging services.

In March 1988 Judge Greene authorized the BOCs to provide transmission (but not content) based information services. Also in 1988 the FCC began approving comparably efficient interconnection (CEI) plans which allowed the BOCs to provide individual enhanced services, such as voice messaging, on a structurally integrated basis. These changes in regulation permitted the BOCs to begin to offer the voice messaging services they had originally petitioned the FCC to provide in 1981. In practice, the BOCs began to offer voice messaging services in 1990. Demand growth for voice messaging has been extremely rapid, with current BOC subscriptions at about 6 million customers. Clearly, the demand for voice messaging existed in the U.S. in the 1980's. The technology also existed to permit voice messaging to be offered on an economical basis. However, the combination of FCC regulation and the information services prohibition of the MFJ delayed the introduction of voice messaging services in the U.S. for somewhere between 5-7 years. We now calculate the effect on consumer welfare of the delay in voice messaging services in the U.S.

²¹AT&T had told the FCC that it would not be economic to provide voice messaging services on a structurally separated basis, but the FCC rejected the claim. Medium and large businesses were able to use voice messaging services through their internal PBXs. These PBXs often had extremely similar designs to the Central Office Switches (COS) used by the BOCs, e.g., the Northern Telecom switches. However, the BOCs were prohibited from using their COSs to offer voice messaging services to their customers due to FCC rules and the MFJ.